#1

OPERATING INSTRUCTIONS

for

TYPE 1211-A

UNIT OSCILLATOR

GENERAL RADIO COMPANY

CAMBRIDGE 39 MASSACHUSETTS

NEW YORK CHICAGO LOS ANGELES

U. S. A.

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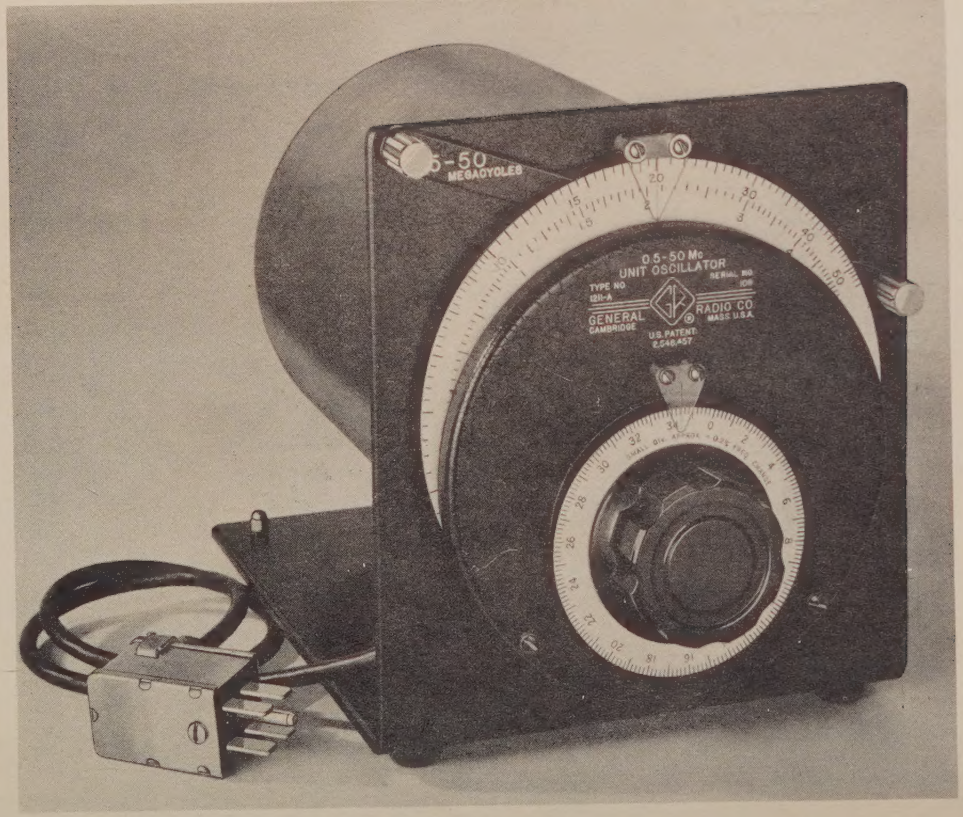
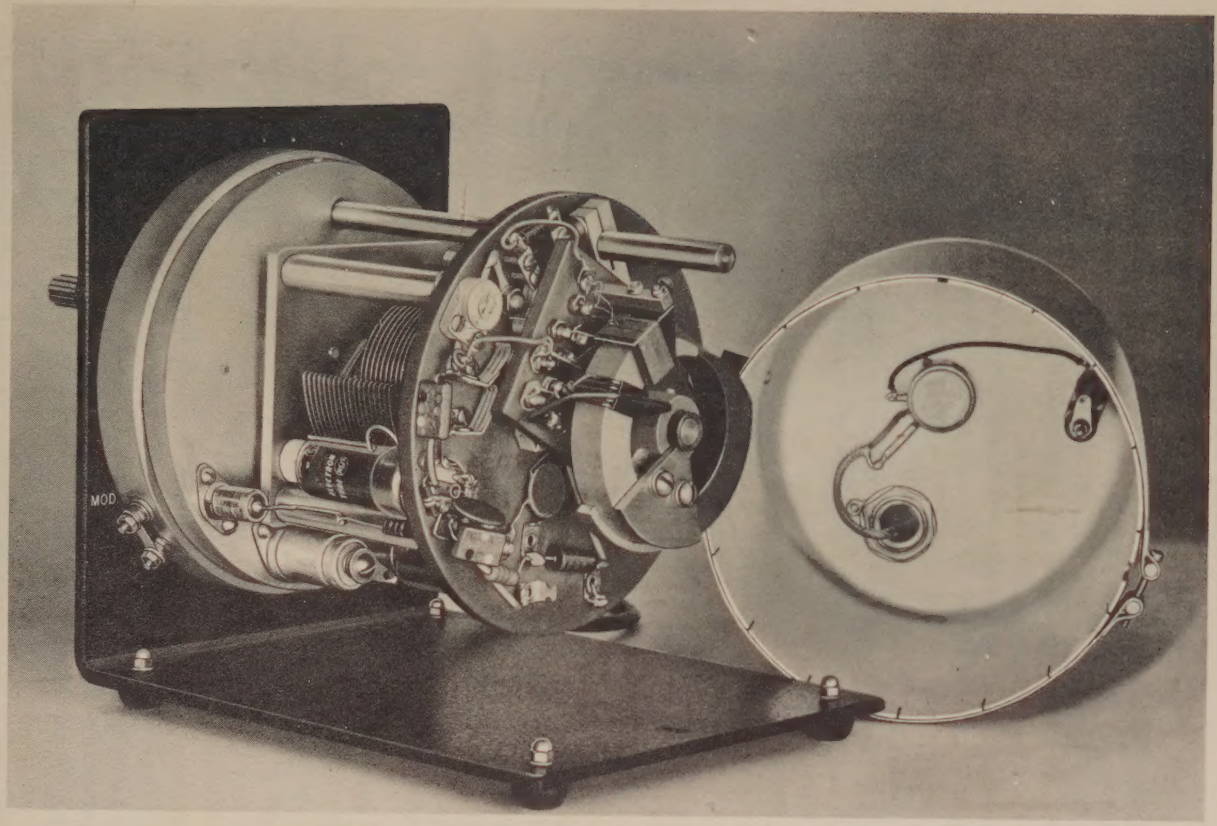


Panel View of the Type 1211-A Unit Oscillator.



Interior View (Rear) of the Type 1211-A Unit Oscillator.

SPECIFICATIONS

Frequency Range: 0.5 to 50 Mc in two ranges.
Frequency Calibration Accuracy: ± 2% at no load.
Frequency Controls: A two position range switch, a 6-inch dial with calibration approximately logarithmic versus angular rotation and a slow-motion dial to indicate frequency increments of 0.2% per dial division.
Output System: The oscillator output is available at a coaxial connector at the rear of the instrument. An adjacent ground terminal also permits connection by means of a Type 274-M Plug. The output is controlled by a small dial, calibrated in arbitrary units.
Output Power: At least 200 milliwatts into a 50-ohm load at any frequency within the range. For the 0.5 - 5 Mc range, the output power is of the order of 2 watts.
Modulation: Direct amplitude modulation over the audio-frequency range can be obtained with an external audio oscillator. The impedance at the modulation terminals is about 8000 ohms and 25% modulation is obtained with about 45 volts. Under these conditions, envelope distortion is of the order of 3% and is a function of carrier frequency setting. The audio source must be capable of carrying the 50-ma dc of the carrier oscillator.

To obtain amplitude modulation free of incidental f-m, the Type 1023-A Amplitude Modulator or the Type 1000-P6 Crystal Diode Modulator can be used at the carrier frequencies above 10 Mc.
Circuit: Hartley oscillator coupled direct to output. Frequency tuning is obtained by simultaneously changing the tuning capacitance and the position of the core in the coils (iron dust core to aluminum core).
Power Supply Requirements: 300 volts at 50 ma dc.
6.0 volts at 0.75 amperes ac or dc.

The Type 1203-A Unit Power Supply is recommended.
Tube: Type 5763 Miniature VHF Beam Power Amplifier which is supplied with the instrument.
Mounting: The oscillator is mounted on an aluminum casting and is shielded with a spun-aluminum cover. The assembly is mounted on an L-shaped panel and chassis, finished in black-crackle lacquer.
Accessories Supplied: Type 874-R21 Patch Cord, Type 874-Q2 Adaptor and Type CDMS-466-4 Multipoint Connector.
Accessories Available: Type 1000-P6 Crystal Diode Modulator, Type 1023-A Amplitude Modulator, Type 1214-A Unit Oscillator, Type 1203-A Unit Power Supply, Type 1204-B Unit Variable Power Supply and the Type 874 Coaxial Elements.
Dimensions: 7 x 8 x 12 inches over-all.

Net Weight: 11-1/2 pounds. U.S. Pat. Nos.: 2,125,816; 2,548,457

Operating Instructions

for

Type 1211-A Unit Oscillator

The Type 1211-A Unit Oscillator is a small, shielded, general-purpose oscillator of moderate power output covering the frequency range of 0.5 to 50 megacycles. It can be amplitude modulated from an external source. Like most instruments of the General Radio unit line, it is designed for operation with the Type 1203-A Unit Power Supply but it may be operated with any adequate power supply.

SECTION 1.0 OPERATION

1.1 INSTALLATION

The instrument is complete with tube and when connected to a Type 1203-A Unit Power Supply, it is ready for operation. For other power supply provisions, see paragraph 1.53 below.

1.2 FREQUENCY CONTROLS

1.21 The range switch, operated by a long rocking arm over the main dial, has two positions with the frequency ranges indicated on the arm: 0.5 to 5 Mc and 5 to 50 Mc.

1.22 The main frequency dial carries a separate frequency calibration for each range.

1.23 The small slow-motion dial which drives the main dial has been calibrated to indicate directly small percentage increments in frequency. Each division of this dial corresponds approximately to a 0.2% change in frequency except at the ends of the main frequency dial.

1.3 OUTPUT CONTROLS AND TERMINALS

1.31 The output is controlled by a small dial at the rear of the instrument. The dial is calibrated in arbitrary units with maximum output at full clockwise rotation of dial. Typical characteristic curves of output voltage into a 50-ohm load are shown in Figure 1. If the load is excessive, the instrument may stop oscillating unless the output control is set back far enough to reduce the coupling to the load.

1.32 The output terminals are at the rear of the instrument near the output control. The output connector is a General Radio Type 874 Coaxial Outlet

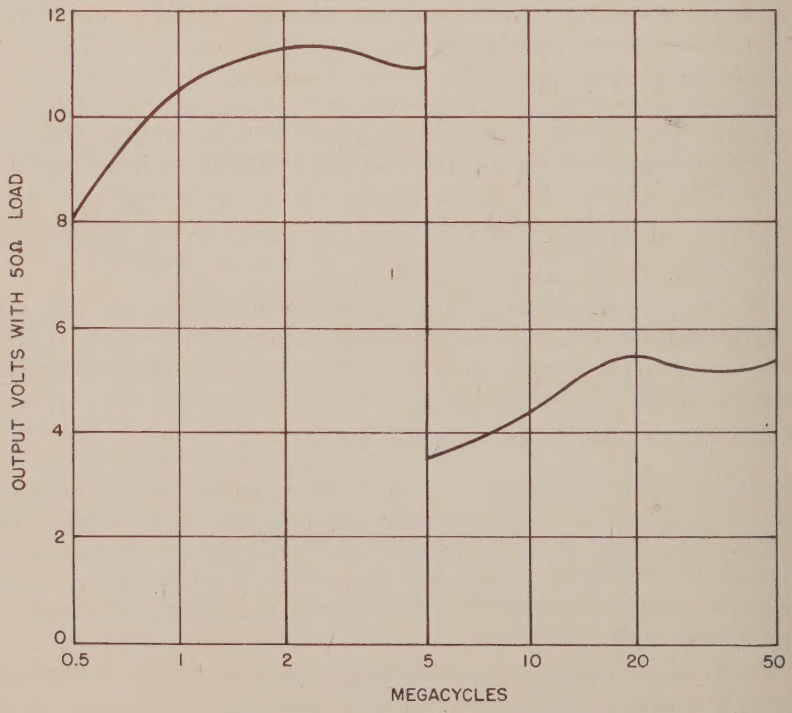
with a grounding terminal mounted next to it. The output accessories include a Type 874-R21 3-foot shielded Patch Cord and a Type 874-Q2 Adaptor which can be plugged either into the output connector or into the output end of the cable. The adaptor permits direct connection either by wire leads or by standard banana-plug connections (Type 274).

When a Type 874 connector (see latest General Radio catalog) is mounted into the load equipment, the use of the Type 874-R21 cable permits continuous coaxial connections from oscillator to load for more complete shielding.

1.4 MODULATION

1.41 Direct amplitude modulation over the audio-frequency range can be obtained by connecting an audio oscillator in the cathode circuit at the MOD stud terminals provided on the right side of the instrument. Opening these terminals interrupts the oscillator cathode current; therefore, the audio oscillator circuit must supply a d-c path and must be capable of carrying 50 ma d-c.

Figure 1. Typical Output Characteristics for Type 1211-A Unit Oscillator



A convenient modulating source is the Type 1214-A Unit Oscillator which delivers about 45 volts at either 400 or 1000 cycles and yields about 25% modulation at full output[1].

1.42 Direct cathode modulation of the oscillator introduces some incidental frequency modulation. Amplitude modulation essentially free of frequency modulation can be obtained at carrier frequencies above 10 mc by using a Type 1023-A Amplitude Modulator[2] or a Type 1000-P6 Crystal Diode Modulator[3]. Both of these instruments are described in the latest General Radio Catalog.

1.5 POWER SUPPLY

1.51 A multipoint plug connector is provided at the end of the shielded power cable for direct connection to the Type 1203-A Unit Power Supply which meets exactly the power requirements of the oscillator.

1.52 The Type 1204-B Unit Variable Power Supply can also be used. The control on the Type 1204-B Supply must be set to limit the operating voltage of the Type 1211-A Oscillator to 300 volts.

1.53 If a supply other than a Unit Power Supply is to be used, connect the multipoint jack connector (supplied as an accessory with the oscillator) to the power supply so that the oscillator and its power supply can easily be disconnected. The correct connections are terminals Number 13 and Number 14 for the heaters. Number 15 for B+ and Number 16 for B−. The power supply (which may consist of batteries) must be capable of supplying 6.0 volts at 0.75 ampere a-c or d-c for the heaters and about 300 volts for the plate circuit. The plate current must not exceed 50 ma.

SECTION 2.0 CIRCUIT AND DESIGN

2.1 DIAGRAMS

An elementary schematic wiring diagram is shown in Figure 2 and a complete wiring diagram is given in Figure 3.

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[1] At high line voltage, the output control of the Type 1214-A Oscillator is best set at full output or at less than 80% of full output to avoid overheating its 10 KΩ potentiometer.

[2] D. B. Sinclair, "A Versatile Amplitude Modulator for V-H-F Standard Signal Generator", General Radio EXPERIMENTER, November, 1949.

[3] W. F. Byers, "An Amplitude Modulator for Video Frequencies", General Radio EXPERIMENTER, March, 1950.

2.2 CIRCUIT

The Hartley oscillator circuit is used. The output control is tapped across a portion of the tuned circuit for the low-frequency range; it is coupled to the tuned circuit by a pick-up coil for the high-frequency range. The tube is the Type 5763 which is a 9-pin Miniature Beam-Power amplifier tube.

The wide frequency span for each range is obtained by varying the capacitance and inductance of the tuned circuit simultaneously. A double-sickle-shaped arrangement of tapered iron-dust core and aluminum core is mounted to turn with the tuning-capacitor shaft. As the frequency dial is rotated, the active core material within the inductor varies smoothly from full dust core for maximum inductance, through a minimum of core to a full aluminum core for minimum inductance. The core shape and the capacitor-plate shape are designed for approximately logarithmic frequency change with angular rotation over the ten to one range.

Modulation is obtained by connecting an audio-frequency source in the cathode circuit of the oscillator.

2.3 SHIELDING

All but the output leads are taken out through a system of filters in a shielded cavity to reduce the external field to a minimum.

The cable to the power supply is shielded and the cylindrical cover which fits over the unit is clamped tightly by a metal strap.

SECTION 3.0 MAINTENANCE

3.1 ACCESSIBILITY OF COMPONENTS

With the shield cover removed, all but the components of the r-f filters are accessible and even they can be checked with an ohmmeter without opening the filter cavity.

When replacing the shield cover, tighten the shield strap to insure low leakage.

3.2 PANEL REMOVAL

For direct access to the r-f filter components, remove the frequency dials and the panel.

When replacing the dials, set the main dial at its reference line (long line below the lowest frequency calibrations) when the tuning-capacitor plates are at full mesh.

3.3 TUBE REPLACEMENT

When the tube (Type 5763) is replaced, no readjustments normally need to be made, even at the highest frequency. While capacitor C-6 has some effect

on the frequency, its major purpose is to maintain the output voltage at the high-frequency end.

3.4 VACUUM TUBE DATA

The following table gives tube socket voltages measured from socket pin to ground. The d-c voltages were measured with a 20,000-ohm-per-volt instrument whose full scale ranges were 10 volts, 50 volts, 250 volts and 1000 volts. Voltages can be expected to vary ±20%. The data were obtained with the instrument supplied by a Type 1203-A Unit Power Supply from a 115 volt 60 cycle power line. The frequency controls were set at 0.5 Mc.

Tube Pin	Volts to Ground
1	+ 250 volts d-c
2	0
3	0
4	0
5	6.3 volts a-c
6	+ 180 volts d-c
7	+ 15 volts d-c
8	- 9.0 volts d-c
9	- 9.0 volts d-c

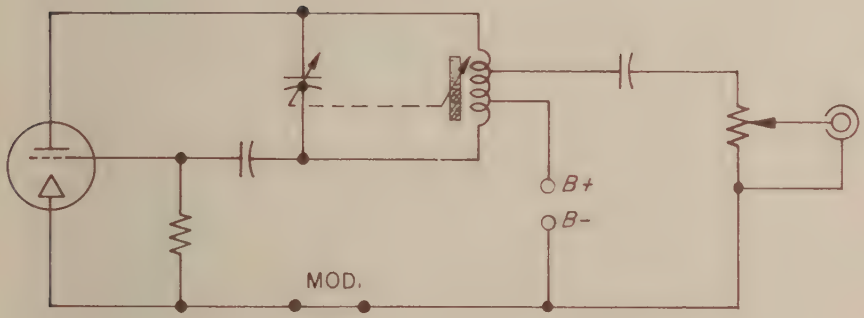

Figure 2. Elementary Schematic Diagram

PARTS LIST

RESISTORS			**TYPE**
R-1	10 k Ohms	±10%	REC-20BF
R-2	250 Ohms	±10%	POSC-12
R-3	2.2 k Ohms	±10%	REC-20BF
R-4	8.2 k Ohms	±10%	REC-41BF
R-5	220 Ohms	±10%	REC-30BF
R-6	330 Ohms	±10%	REC-30BF
R-7	27 Ohms	± 5%	REC-20BF
R-8	220 Ohms	±10%	REC-30BF
R-9	680 Ohms	±10%	REC-41BF
R-10	330 Ohms	±10%	REC-30BF
R-11	510 Ohms	±10%	REC-20BF
CONDENSERS			
C-1	100 µµf	±10%	COM-20B
C-2	0.01 µf	± %	COC-63
C-3	75 µµf	± 5%	COM-20B
C-4			
C-5	21 - 820 µµf		848-404-3
C-6	7 - 45 µµf		COT-12
C-7	0.01 µf	± %	COC-63
C-8	0.01 µf	+20% -10%	COU-31
C-9	0.2 µf	+20% -10%	COU-32
C-10	0.2 µf	+20% -10%	COU-32
C-11	0.01 µf	+20% -10%	COU-33
C-12	0.2 µf	+20% -10%	COU-34
C-13	0.2 µf	+20% -10%	COU-34
C-14	0.047 µf	±10%	COL-71
MISCELLANEOUS			
S-1	Switch		Built in
L-1	Inductor		ZCHA-29
L-2	Inductor		ZCHA-29
L-3	Inductor		1211-27
L-4	Inductor		1211-86
L-5	Inductor		1211-801
PL-1	Plug		274-360
PL-2	Plug		1211-33
J-1	Jack		BUMT-135A
J-2	Jack		874-404
Tube			
V-1			5763

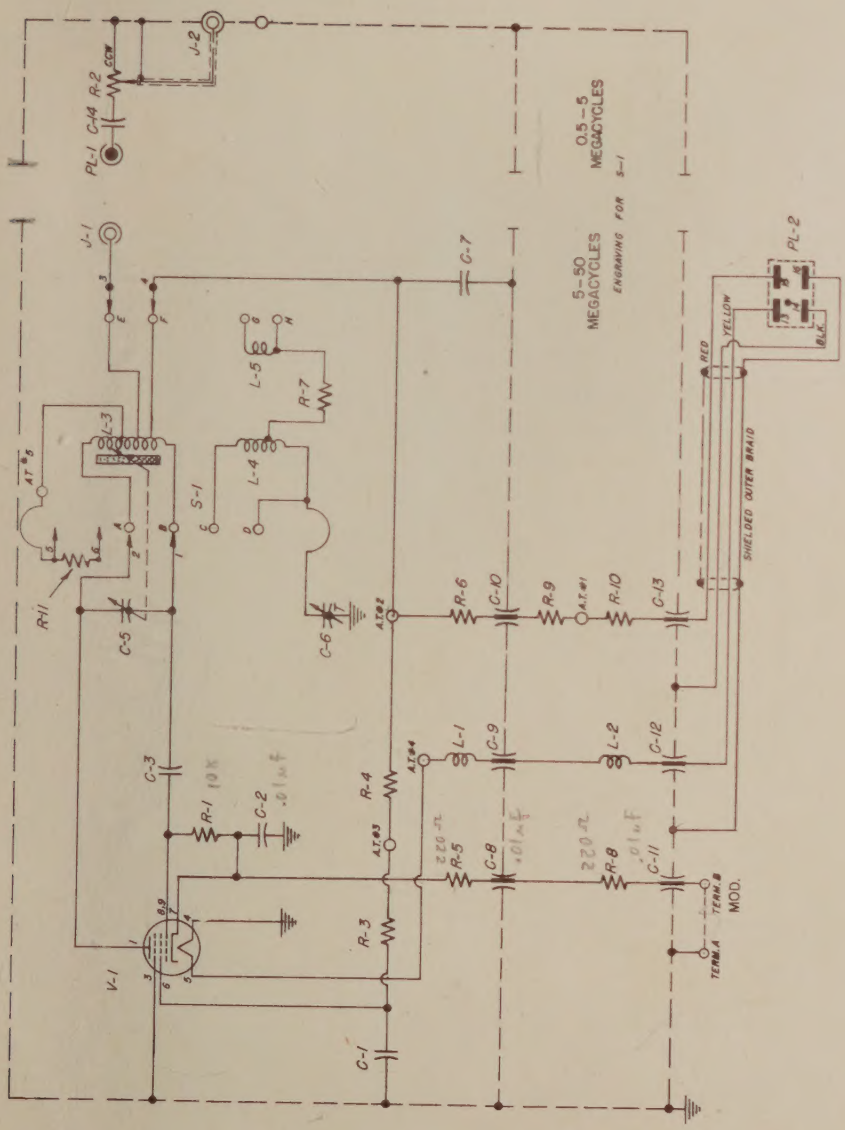

Figure 3. Wiring Diagram for 1211-A Unit Oscillator